

Selected Abstracts from Other Physical Review Journals

Abstracts of papers that are published in other Physical Review journals and may be of interest to Physical Review A readers are printed below.

Effect of frequency detunings and finite relaxation rates on laser localized structures S. V. Fedorov,¹ A. G. Vladimirov,² G. V. Khodova,¹ and N. N. Rosanov¹ ¹*Institute for Laser Physics, Vavilov State Optical Institute, Birzhevaya line 12, 199034 St. Petersburg, Russia* ²*Physics Faculty, St. Petersburg State University, 1 Ul'ianovskaya Street, 198904 St. Petersburg, Russia* (Received 17 June 1999)

We study, analytically and numerically, the effect of frequency detunings and relaxation processes in laser media on stability and bifurcations of dissipative optical localized structures (DOLS's) in a transversely one-dimensional laser with a saturable absorber. The approximate envelope equation, with an intensity dependent effective coefficient of the diffusion, is derived. Andronov-Hopf bifurcations resulting from frequency detuning and leading to oscillatory DOLS's are analyzed numerically. A numerical and analytical study of bifurcations of transversely motionless DOLS's in a laser with finite relaxation rates of amplifying and absorbing media is performed. New types of DOLS's are found, including those moving with a large transverse velocity and those moving with a periodically oscillating transverse velocity. Hysteresis between different types of DOLS's is demonstrated. [Phys. Rev. E **61**, 5814 (2000)]

Generalized variational principle for the time-dependent Hartree-Fock equations for a Slater determinant H.-J. Kull *Institut für Theoretische Physik A, Rheinisch Westfälische Technische Hochschule, D-52056 Aachen, Germany* D. Pfirsich *Max-Planck-Institut für Plasmaphysik, D-85748 Garching, Germany* (Received 12 July 1999)

The time-dependent Hartree-Fock equations are derived from a variational principle for the general N -body action of a Slater determinant of single-electron orbitals. The variational principle generalizes commonly used variational treatments based on reduced two-body actions. The self-consistent field equations are found to contain time-dependent corrections to the standard mean-field interactions. Their physical significance is discussed and a time-dependent phase shift to the Slater determinant is obtained that properly accounts for the total interaction energy in the mean-field approach. [Phys. Rev. E **61**, 5940 (2000)]

Theory of Čerenkov and transition radiation from layered structures B. Lastdrager, A. Tip, J. Verhoeven *FOM-Instituut voor Atoom- en Molecuulfysica, Kruislaan 407, 1098SJ Amsterdam, The Netherlands* (Received 24 August 1999)

A scattering theoretical approach is used to describe the generation of both transition and Čerenkov radiation due to the passage of fast electrons through layered, in general absorptive, dielectrics. It leads to a considerable improvement over the coherent summation method usually employed. Reflection of the produced radiation from the layer interfaces is now properly taken into account and absorption of radiation, if present, is automatically taken care of. The usual restriction that the energy of the produced photons must be small relative to the initial electron energy is lifted. In contrast to existing theories the production of Čerenkov radiation, if it takes place, is included as well. Our expressions for radiation production feature the eigenmodes of the Helmholtz equation for the dielectric and we discuss how the latter can be obtained by means of a transfer matrix formalism. A numerical evaluation shows that under the appropriate conditions our results are in agreement with those from the coherent summation formalism. Finally, we present numerical results that give an impression of the relative yields for transition and Čerenkov radiation. [Phys. Rev. E **61**, 5767 (2000)]

Noise-induced chaos in an optically injected semiconductor laser model S. K. Hwang, J. B. Gao, and J. M. Liu *Department of Electrical Engineering, University of California, Los Angeles, Los Angeles, California 90095-159410* (Received 4 January 1999; revised manuscript received 30 August 1999)

The chaos induced by an intrinsic spontaneous-emission noise in an optically injected semiconductor laser is investigated through a single-mode injection model. A method is developed to quantitatively study the scale-dependent noise effect in general, and the noise-induced chaotic feature in particular. We find that noise at an experimentally measured level can induce chaos in the system. This suggests that noise-induced chaos may indeed exist in real systems. Certain required characteristics for noise to induce chaos are identified: the periodic state itself, when subject to weak noise, should undergo a process that is much more diffusive than the Brownian motion, and the adjacent chaotic states should still behave chaotically on certain finite scales when subject to noise. We believe they are generic features for noise to induce chaos. The correlation dimension of the clean and noisy attractors is also calculated to study noise-induced changes in the geometrical structure of the attractors. [Phys. Rev. E **61**, 5162 (2000)]